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Route to

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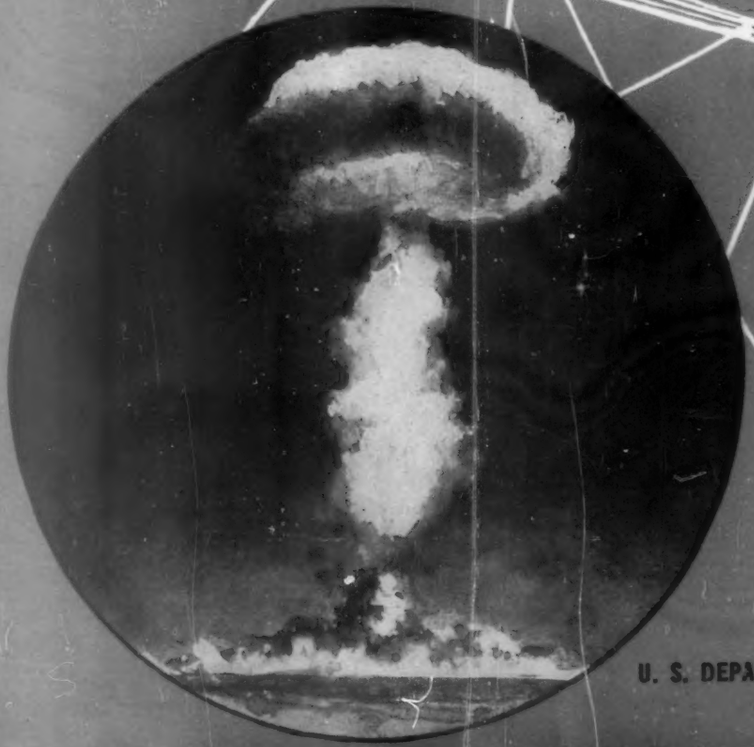

Special Issue

Citizenship for an Atomic Age

U. S. DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE Office of Education

Citizenship for the Atomic Age

Every age has faced grave problems. But in no other age have there been problems as complex or as perilous as those confronting us today. Twentieth Century technology, which has brought mankind so many blessings, has also increased man's power to do evil. Today, the forces of good and evil hang in precarious balance—a balance which must be overweighted for good if we are to preserve our civilization. Avoidance of an atomic war is the paramount problem for the young men and women now in our schools who will assume the privileges and responsibilities of citizenship in a few short years. How will they be equipped to solve the problems of an atomic age? Will they be wiser, more patient, more firm, of keener vision than our generation? Will they have a deep sense of religious and moral responsibility? The answer rests heavily upon the educators of the free world—upon dedicated leadership in the schools and in the pulpits of this and every free land.

LEWIS L. STRAUSS

—Chairman, U. S. Atomic Energy Commission

VAL PETERSON

Faith, hope, and courage are vital elements of the American spirit. The tensions of today's world make great demands on that spirit. Never has the need for responsible citizenship been so great. Never has good citizenship had more at stake. Never has the promise of the future been so bright, if we be strong, if we be resolute, if we be dedicated. The schools of our Nation have done much to preserve the ideals of democracy and to develop responsible citizenship. I commend our school administrators and teachers for their strength, their resolution, and their dedication to great purposes.

—Administrator, Federal Civil Defense Administration

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Atomic Energy and Civil Defense Teaching Aids. *Inside back cover*

THIS special issue of SCHOOL LIFE—"Citizenship for the Atomic Age"—presents information furnished by the Atomic Energy Commission and the Federal Civil Defense Administration.

The Office of Education is pleased to offer this timely report to educators and the public as a supplement to Volume 35 of SCHOOL LIFE.

Publication of this special issue was approved by the Bureau of the Budget, and is in line with the traditional mandate for the Office of Education ". . . to promote the cause of education throughout the country."

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Living Without Fear In a Century of Continuing Crisis

by R. J. Blakely,* The Fund for Adult Education Established by the Ford Foundation

HOW could *anyone* live without fear in *any* century? No age has been without its reasons for fear. For most human beings, at least one of the Four Horsemen, when not actually thundering around, was not far away. Whenever a people or a class has felt secure simply because it judged that it deserved to be secure or was lucky, history has quickly and cruelly exposed that delusion.

How in particular can one live without fear in the second half of the Twentieth Century?

The Soviet Union developed nuclear weapons much sooner than most experts anticipated. It would be foolish to assume that the Soviet Union will not soon have them in a sizeable number.

American nuclear development indicates at the very least that there is some reason to believe that the fusion bomb is both possible and deliverable. It would be foolish to assume that what is possible for us is not possible for the Soviet Union.

It must be assumed that methods of the delivery of nuclear weapons have been vastly improved since World War II and will continue to be improved by the U. S. S. R. as well as by the United States. Defense against delivery, in the light of the damage which even a few weapons can do, almost certainly has not kept pace.

Nuclear weapons are only one kind of "weapons of mass destruction." In others, such as radioactive, biological and chemical poisons, the Soviet Union must be assumed to have made and to be making headway.

The American society, because of its highly industrialized nature and its intense concentrations of physical resources and people, is the most vulnerable society on earth to weapons of mass destruction.

To speak very mildly, the American people's efforts to reduce their vulnerability to weapons of mass destruction have been inadequate.

Plainly, we are facing greater dangers and are having made upon us greater demands than any other generation in history. These dangers and these demands are not passing ones. They will be with us and increasing in magnitude for as far ahead as even the most optimistic can foresee.

This may seem a strange way to begin an article on living without fear. But what is fearlessness? It certainly is not being ignorant of or refusing to accept reality. It is not even—despite the language—not feeling fear. Fear is a response given us by nature to help us survive. A better phrase would, perhaps, be "how to live courageously," for courage means carrying on, despite fear, with intelligence and purpose.

Both intelligence and purpose require us to ask, "What produced the continuing crisis in which we live? What can we do about it?"

Within the limits of this article, I list three of the main factors which have brought the present situation to pass.

*Manager, Office for the Central Region.

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1. *Increasing control over nature without comparable control over society.* Nuclear weapons are the most spectacular products of the "age of science." But four points should be kept in mind.

First, science has produced much good and promises even more good. The nuclear bomb and the germ capsule are concentrates of knowledge which hold almost unbelievable potential boons for mankind.

Second, the essence of science does not lie in its products, either for good or for ill. It lies in an attitude and a method—the attitude of "methodic doubt," the refusal to accept any proposition merely on authority; the method of critical analysis, hypothesis, observation, experiment and verification.

Third, the technology of science is the product of intellectual and social freedom generally; it thrives best in an atmosphere of general freedom.

Fourth, although specific methods must be appropriate to different subject matter, the attitudes and methods of science applied to society may have as vast potentials as they have applied to nature. In horrible ways we have seen this in nazism and communism. Always we must remember that science itself is amoral. It is the persons who use it and the ends and the means in the service of which they put it to use that make it moral or immoral. Already we know enough to see that the social sciences can be one of the first handmaidens in the service of a humane, rational and decent world.

2. *Democracy without adequate preparation for wise "rule by the people."* The simple and powerful meaning which the peoples of the world have read into the ideas of the present age is that the conditions of life need not be accepted passively. Volcanic resentments and tidal yearnings have been unleashed. These have resulted in a series of revolts and revolutions, national and social.

When groups of individuals who have not shared in government seize the reins, let us not be surprised that they do not handle them well. In the first place, it is rare that they are given the reins peaceably and rarer still that they are tutored before the surrender. In the second place, self-government, like walking, cannot be learned without practice, and practice means falls and dangerous climbs.

Many are the demagogues to exploit and pervert the people's resentments and yearnings. The American people were the first to develop self-government; they have achieved the highest success. Theirs are the opportunity and responsibility to help guide the torrent of democracy into the proper channels, to guide most importantly by example, but also by wise instruction and assistance.

3. *An interdependent world made up by all the cultures and subcultures of the human race without either a pervasive toleration of differences or an adequate system for dealing peaceably with common affairs.* Did human kind evolve in one place and migrate over the planet? Or did it evolve independently in several or many places? This is a subject for speculation and debate. Regardless, human kind is at once more the same and more various than any other species. It is more similar in its fundamental characteristics and capacities. It is more various in the expressions of these characteristics and capacities. It is similar in that each human must learn everything he knows. It is different in that each human is the creature of his culture, and human kind has a bewildering variety of cultures.

The creatures of each culture naturally regard their way of life as "the way" and all other ways of life as inferior at least and menacing at worst. Yet, today, because of science all cultures and subcultures are intimately in contact and intricately interdependent. And, because of the urge for self-determination, which is nationalism in terms of peoples, and democracy in terms of individuals, each culture is striving grimly for self-fulfillment.

Many are the false prophets and the deceivers who would turn old tired imperialisms into new vigorous ones. What is needed is a genuine respect for differences and a willingness to work together. This is a description on a planetary scale of what the American society has achieved on a national scale. It calls attention to the opportunity and the responsibility of the American people to give leadership—a leadership which learns and educates and develops further leadership.

In sketching how we arrived at this century of continuing crisis, I have tried to indicate that the situation is a product of achievement. I have tried also to indicate the hopeful aspects and the main courses of the things to be done.

Against this background and in this forecast, let us look at the purposes of civil defense. They are at least four:

1. To help prevent a war or other disaster. 2. To prepare to help win a war or overcome disaster, should one occur. 3. To help reduce the loss of civilian life and property during war or disaster. 4. To help increase the Nation's ability to resume activity afterwards.

Civil defense will contribute to the prevention of war, because it will reduce the advantages of attack. In this respect, it is affirmative. In this respect, it should not be regarded as pessimistic by ourselves, discouraging by our allies, or ominous by our enemies.

However, no program limited to such matters as decentralization, plane-spotting, stockpiling and the like—as necessary as these are—can hope to succeed. Civil defense must be a part of a larger program. This program cannot be negative; it must be highly affirmative. And affirmation is not made by fear. It is made by confidence and hope.

At this point, I would like to return to the three major factors which produced this century of continuing crisis—the incomplete achievements and the unfinished business of science, democracy, and the multicultural world society which is being born.

Who would choose a different time in which to be alive? Who has taken the leadership in science? Western society, of which the American people are a part. Who has taken leadership in applying science for humane purposes? The American people. Who has fully demonstrated the rights and duties of self-government, both nationally and individually? The American people. Who has shown the greatest sensitivity for the rights of subject people to be free? Who has taken leadership in trying to create a world which at the same time respects differences and provides machinery for the peaceable adjustment of conflicts? The American people.

This is our heritage, and these are our advantages. We have made mistakes and we have lost time. But ours is the opportunity and the responsibility to fulfill our heritage and to offer new leadership. Since the essence of a free society is the individual, the opportunity and responsibility are personal to each of us.

How then do we dare to be afraid?

How a Small High School Meets the Challenge of the Atomic Age

Student-constructed model atomic pile at the Suffern (N. Y.) High School.

by Gerrit C. Zwart, Suffern High School, Suffern, N. Y.

ABOUT 100 YEARS AGO the words coil, current, conductor and a few others gave new meaning to the slowly awakening giant we now know as Electricity. Only yesterday an even greater giant came into our lives from the unknown, with a violence and a vengeance that often makes us think that we might better have left this veritable Pandora's box strictly alone. Today we hear such words as atomic pile, breeding, fission, fusion, Geiger counters, etc., all of which are being gradually included in everyday thoughts and speech.

My students and I are somewhat impatient with the layman's lack of interest. We have a consuming convietion that, whether he likes it or not, we are all enmeshed in a fantastic framework of fate . . . like a fly caught in a spider web.

We have been told that there can be no small atomic bomb to do the work of blasting . . . that the atomic furnace is too hot, too dangerous, too costly for everyday use. We don't believe these rumors; in fact we are convinced that while experts sit around board of directors' tables deciding that a thing can't be done, perhaps someone will be doing it. We feel the atomic surface hasn't been scratched—that results will stagger even the wildest imagination. We believe that the language of science, although only too recently concerned with war and weapons, can be directed just as effectively toward the betterment of human understanding . . . that atomic energy can be put to such peaceful uses as to make a utopia for all mankind.

This report includes some of the activities of the Suffern High School Atomic Energy Club as well as its hopes for future programs. We draw no line on membership. Anyone who wants to make model cyclotrons, reactors or atom smashers, is welcome . . . as are art students who like to make charts and posters; writers and reporters for our school and town newspapers or simply technicians and stage hands to help put on an assembly program or an "Atomic Medicine Show." The study of Atomic Energy in our senior science classes is required, with access to current literature and advanced work for interested students.

Also, on a lower level and to a lesser degree, in elementary science where many of the simpler types of demonstration which have to do with the nature of matter and energy can be shown, every effort is made to get this grade level accustomed to the new vocabulary of atomic energy. Experiments in evaporation, solution, diffusion, impenetrability, adhesion and cohesion, the composition of matter and others are introduced to the Junior Tommy Edisons and the young Marie Curies in natural classroom situations.

Our social studies teachers cover the implications of atomic energy for the field of medicine, criminology and agriculture as well as military aspects. With student discussion groups attempts are made to appraise such things as the desirability or futility of using atomic weapons for strategic and tactical purposes.

The Atomic Story

Ever since 1945 our club has been active on "Cavalcade Night" (open house night for parents and friends) in bringing before the people of our community the atomic story. One of the first projects was an assembly program of the Hiroshima bombing. The following year the historical background and individual contributions by various nations formed the theme. At another annual party night we had a display of the tools of the atomic scientist, mostly student-made.

For our project last year, with the help of the speech teacher, we produced a one-half hour radio play entitled "The Peaceful Atom" which was broadcast by the students themselves over Station WLNA, Peekskill, N. Y. We also made a permanent tape recording of the broadcast for future use.

This year our "Open House" night featured student-conducted tours through the science department which was dressed up like a miniature Brookhaven exhibit. Visitors were met at the entrance by student guides who directed them from table to table. At the first table the visitors heard a brief summary of the historical background of the atomic concept.

At the next table a large student-painted poster formed a backdrop for the speaker who revealed the "secret" of the atomic bomb. Just beyond, fission and fusion were explained with the aid of tinker-toy models, followed by a simplified interpretation of Einstein's famous formula for the equivalence of matter and energy. At table No. 5 an excellent 1-foot model of the large Brookhaven reactor was described in some detail. From here the

(*Continued on page 160*)

The Atomic Age Moves Forward

by Gordon Dean, Former Chairman, U. S. Atomic Energy Commission

NO ONE can predict the future, but if past performance is any gage, we need only look at the astounding rate at which the atomic age has progressed in its first decade to be convinced that the potential benefits of atomic energy are truly enormous.

To obtain these significant results we have concentrated our best efforts on the military application of atomic energy, because it has been our primary concern to preserve the security of this Nation while lending a helping hand to other peoples in their struggle to stay free. There is undoubtedly an awareness in the teaching profession of the unpleasant realities that have required us to put such great emphasis on the purely destructive potential of the atom. This first decade of the atomic age might have taken a different turn had mutual understanding and cooperation among the big world powers endured after World War II, for it was in 1946 that the United States, the sole possessor of the atomic bomb, offered its plants and stockpiles of fissionable materials to an international authority which would control the development of this new force for peace. This offer met rejection by the Soviet Union and its satellites, however, and hope gave way to mounting tensions, peace to Communist aggression.

Development Ahead

We offer no apology for the fact that most of our effort in the atomic field has been directed toward the development of weapons. Indeed, our past achievements in this field will not lessen to any degree our continued concentration on the military aspects of atomic energy. It is generally agreed that our stockpile of atomic weapons is a principal deterrent to world war III, the threat of which, nonetheless, persists.

In taking stock of the atomic age to date we can take pride in the fact that despite our preoccupation with weapons significant strides have been made in putting the atom to work for purposes other than military. These advances, coupled with our weapons' successes and with the desire of private industry to be allowed to assume some of the burden of the development work ahead, make 1953 a noteworthy year in the peaceful life of the atom.

We have already established that electric power can be obtained from the atom. The first successful demonstration was made in December of 1951 in the experimental breeder reactor at Arco, Idaho. On March 9, 1953, the experimental homogeneous reactor at Oak Ridge provided 150 kilowatts of electricity, enough to light 50 average 5-room dwellings. The prototype power plant for a submarine engine also began operating early this year.

The principle of using the heat generated by a nuclear reaction to produce electricity has been proved beyond doubt. From the technological standpoint it is now only a question of development to bring the costs of atomic electricity down to where they can compete with those of electricity from conventional sources.

The potential power to be harnessed from the atom staggers the imagination. There is the same amount of energy in one pound of fissionable material as in 2,600,000 pounds of coal or about 300,000 gallons of gasoline.

Another recent accomplishment is the successful demonstration of the breeder principle by the same reactor which first demonstrated that the atom will produce useable electric power. In this experiment it was proved that fissionable material can be produced from nonfissionable uranium at least as fast as it is consumed in a nuclear reactor. The result is that we now have the means by which we can ultimately use all of the uranium in the world for fuel, instead of just a part of it as was heretofore the case.

This development represents another triumph for our scientists and engineers, and constitutes an encouraging and important factor in determining the best technical and economic approach to competitive atomic power. While the United States is blessed with conventional power resources adequate for its needs for years to come, the realization of atomic power should enable us to conserve those resources for coming generations. And, just as important, it should help large areas of the world that lack coal

As part of an experiment to secure basic data on body processes, Oak Ridge scientists inject radioactive material into bloodstream of a steer. *Atomic Energy Commission photo.*

or oil or water resources to become industrialized with attendant material benefits which, God willing, will contribute to world peace.

I suggested earlier that the outstanding accomplishments of atomic science in its brief life span give us a yardstick by which to measure the possibilities of the future. Let me cite a few more of these accomplishments now.

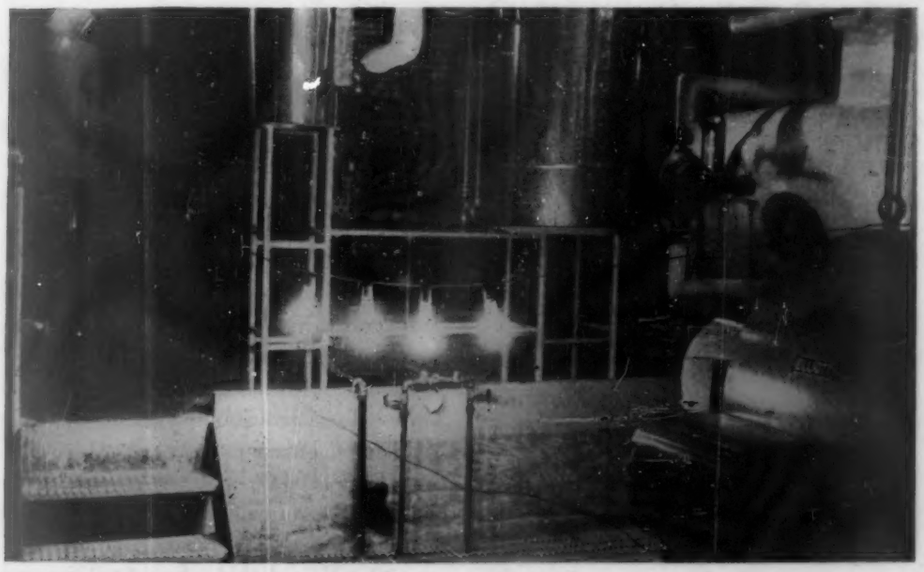
One product of atomic energy that is frequently heard of is the radioisotope, which has been called the greatest research discovery since the microscope. Thirty thousand shipments of this product of the atomic furnace at Oak Ridge have been distributed to more than 1,000 medical, industrial, agricultural and scientific institutions in every state in the Union, our territorial possessions, and 35 foreign countries. And several thousand scientists and technicians have been trained to use them.

Radioisotopes in Medicine

While by far the greater portion of these radioisotopes are used for basic research in biology and medicine, agriculture and industry, they have already proved to be of some value in medical diagnosis and therapy. Radioactive iodine, for instance, has been used successfully in the diagnosis and treatment of hyperthyroidism and in the location of thyroid cancer and cancer offshoots. Some brain tumors can now be detected with a radioactive dye prior to surgery and without discomfort or injury to the patient. The pattern of the blood flow, whether the circulation is good or poor, and the exact location of arterial constriction can now be determined by the injection of a radioactive sodium solution at a given point in the blood stream.

Radioactive iodine has given relief to patients suffering from angina pectoris; and radioactive strontium has proved useful in treating small lesions and benign tumors without surgery in highly sensitive areas such as the eye. The strontium isotope is also readily adaptable to therapy of postoperative lesions. Radioactive phosphorus is now standard treatment for certain blood disorders.

Less than a generation ago, several radioisotopes became available to medical scientists for the first time, but in very limited quantities, as byproducts of the development of new high energy particle accelerators. Their use for the treatment of cancer was immediately recognized, but limited by prohibitive costs and minute supplies. It was a boon to cancer research, therefore, when the infinitely more cheaply produced and plentiful radioisotopes from our reactors were made available to the medical profession. At first, to stimulate the exploration of methods of using radioisotopes against cancer, these products were provided free of charge for cancer studies and treatment except for cost of transportation and handling. As this encouragement has become less necessary, the Commission now charges 20 percent of production costs and there does not seem to have been any falling off in requests for these atomic energy products.



First known use of electric power from atomic energy produced Dec. 21, 1951, at the Atomic Energy Commission's National Reactor Testing Station, Arco, Idaho. *Argonne National Laboratory photo.*

For Cancer Research

The distribution of radioisotopes represents only a part of the Commission's overall support of cancer research within and outside its facilities. A 30-bed hospital is maintained at Oak Ridge devoted exclusively to the study and experimental treatment of patients. A 1,000 curie source of radioactive cobalt which is as powerful as 1,000 grams of radium will soon be treating cancer at this hospital. At the Argonne National Laboratory (in Chicago), a $4,180,000 hospital completed in May of 1952 is also serving medical science in its fight against cancer. At the University of California School of Medicine in San Francisco, we have built a radiological laboratory equipped with a betatron to be used in the treatment of cancer.

Moreover, the AEC is supporting directly, at universities and medical schools, work involving unique applications of atomic energy developments to cancer, such as the use of radiogold in interstitial therapy, and the use of Cobalt 60 in needles, seeds, etc., in place of the more expensive radium.

Grateful acknowledgment is due our Canadian colleagues for their invaluable contribution to medical science in this country as well as in Canada by producing the first high intensity cobalt sources which hold forth such promise to teletherapy. Other high intensity cobalt sources have been provided by the Canadians to the Lankenau Hospital Research Institute in Philadelphia and the Montefiore Hospital in New York.

Another fascinating use of atomic energy in cancer treatment is the effort to exploit neutrons produced in the Brookhaven pile in the treatment of brain tumors. Encouraging progress has been made in this experiment.

These are but a few examples of how atomic energy is being directly exploited in the medical sciences. Many other biomedical advances are being made through atomic energy. In solving health problems of atomic energy operations, for instance, and in studying how to combat the effects of atomic warfare, biomedical scientists are adding whole pages to fundamental knowledge of the body's processes which should in one way or another profit mankind.

(Continued on page 156)

Protective Citizenship—Its Educational Implications*

by Jack T. Johnson, Provost, Hofstra College, Former Assistant Administrator, Federal Civil Defense Administration

THE TEACHERS OF AMERICA are continuously guiding education in the light of realities of contemporary life.

Among present realities are the possibility of attack by an aggressor and the continuing probability of a state of international tension.

Because of the potential danger of attack, the schools in target areas must make certain adjustments quickly. Shelter areas should be ascertained and designated; programs for self-protective drills should be developed; and parents should be informed of the plans for children under emergency conditions. School life to the extent that it is educationally sound must become a part of the protective program of the community.

Because of the implications of a long period of crisis, all of our schools must make adjustment. The concept of protective citizenship should be studied as a fundamental aspect of American life. This, of course, is merely a new dimension of citizenship education.

Civil defense is a part of this pattern of protective citizenship, to be accepted by our citizens and to be developed in our schools under the guidance of well-trained teachers.

America knows something of modern war. But fortunately, its hardest lessons have not been brought to our shores. To study the tragic lessons of ruin and rubble, we must go to the shattered cities of Europe and Asia.

But this we know, there would be no immunity from attack in the event of another war. The enemy has bombers, bombs, and the ability to reach every critical target area in the United States. The enemy objective would be to destroy our productive capacity and our will to resist.

Civil defense is an instrument for winning that war, should it come; and civil defense is a positive technique for preventing war.

If an aggressor felt that our weakness on the homefront or our lack of civil preparation invited easy victory, it would be an added inducement to attack us. The blows of war are struck with a purpose. If instead of weakness we have homefront strength, the purpose of enemy attack may be denied. Therefore, the blow may never come. Thus, civil defense is an integral part of our plan for peace.

Education for Peace

Protective citizenship is not new. We support police to protect us from lawbreakers. We teach children safety education to protect them from the hazards of everyday life. We accept the principle of insurance to protect us from the unforeseen. Civil defense is in this great tradition.

How then can our schools strengthen our hopes for peace and broaden our obligations of citizenship?

At the outset, let me clarify the position of the Federal Civil Defense Administration with regard to its relationship to education as a force for peace.

We believe that educators and educational organizations should be met on educational terms. We wish to encourage them to independent educational activity regarding civil defense. We do not regard educators as customers for preconceived programs or as mere channels of communication. The review of many well-conceived programs throughout our nation which have been entirely due to the activities of State and local leaders indicates to us that there is no lack of local initiative.

We believe that the concepts of civil defense should become a part of going educational programs. We view with alarm attempts to promote drastic intrusions on an established curriculum.

We believe in communicating with educators through established educational channels rather than through artificially created, more expensive, and less effective ones. Again our experience in working through such channels has been reassuring.

We see our present roles as sharpening objectives and improving the climate in which educators must work.

With these beliefs clearly in mind, let us turn to certain specifics of civil defense education.

1. Schools and colleges in potential target areas should develop protective plans. If they have not already done so, administrators have a responsibility for locating shelters, for instructing students in self-protection measures, and for informing parents of plans to care for children during an emergency. This is the obligation to perfect plans for the protection of life and property. This program should enlist the cooperation of administrators, teachers and students, and be based on a full understanding by all concerned on why such measures are needed.

2. Each school should define the role it is to play in an emergency both in regard to its own program and that of the community. How should school facilities and school personnel be utilized?

*An address before the Florida Education Association, Tampa, Fla.

Disaster planning by ninth-graders in Broughton (N. C.) High School. *The Raleigh Times photo.*

This definition can be locally oriented. Is the school in a target area, in a support area, or in a remote area?

This definition should be worked out with the cooperation of local and responsible civil defense officials.

This definition should ask the schools to assume tasks related to regular educational functions.

This definition should also be explained to the general public in order to gain local understanding and acceptance.

3. Educators should recognize the general education aspects of civil defense. For example, protective citizenship intensifies a sense of social interdependence and group solidarity, broadens an understanding of interpersonal responsibilities, and improves our understanding of the world in which we live.

Such fundamental civil defense concepts as mutual aid and mobile support are new words to our vocabulary. But they are simply new examples of old ideas. In an interdependent society, our cities cannot survive without our farms, and the life of our rural areas is tied into the life of our urban areas. This is why we can say that "civil defense is everybody's business."

4. An understanding of civil defense can be integrated with specific subjects already in the curriculum. The facts of biological warfare can be included in courses in botany; the facts of civil defense as an instrument of peace can enrich courses in international relations; the problems of panic can have application in courses in psychology; the need for individuals skilled in emergency mass care can be emphasized in courses in home economics; and an analysis of urban vulnerability can be a part of courses in government.

And so it goes for every subject in the curriculum and at all levels. Civil defense does not supplant that which is now offered. It makes more meaningful those subjects now taught.

5. Scholars have always taken the lead in exploring the frontiers of knowledge. At no time in the history of man have our problems been so varied, so exciting, and so challenging.

Thus, graduate schools and all other educational institutions have a responsibility to focus upon the problems of our atomic age. In this connection, it may be fair to state that the implications of civil defense are proper topics for further investigation.

6. The plans, the objectives, and the principles of civil defense are new. Consequently, they must be professionalized. Here the participation of teachers through their associations and organizations can be of vital assistance in supplying the best guidance in educational aspects of civil defense by educational experimentation.

By discussions in professional meetings, by seminar consideration, and by independent writing, the goals and responsibilities of civil defense can be introduced into the fabric of American life.

7. A corollary to the professionalization of civil defense is the use of established school and college programs for specialized skill training.

A major task for civil defense is to see to it that firemen are trained in the responsibilities of atomic fire fighting, that policemen are skilled in the tasks of the mass movement of people, and that local governmental officials recognize the impact of an emergency upon their political structure. These are among many others.

Where should this training be given?

It would seem that established fire schools, extension services, and bureaus of government research are logical places to begin. These programs are already underway. They need only to be adapted to the problems of an atomic age.

8. As every educator knows, no training can be given without adequate training materials. The preparation of training materials is a traditional function of school men and women.

In cooperation with State and local civil defense officials, teachers can be called upon for advice and guidance. And in many instances, school administrators can adjust schedules which will allow teachers to help in preparation of manuals and training aids. This is the normal function of our schools.

9. Local civil defense directors might call upon the schools for help in the solution of their specialized problems.

10. Finally, the schools should take the lead in formulating plans for the continuity of education during the time of crisis.

Two principal problems should be considered. How can the schools best cope with a general shift in student population?

How can educational facilities be improvised if normal ones are disrupted? It is possible that many of the usual facilities will be destroyed in case of mass attack on our urban areas. Plans will have to be available for substitute classrooms, substitute textbooks, and substitute teachers.

These plans must come out of our schools and colleges. They must be planned in advance. They cannot be improvised after a disaster has taken place.

This program makes up a task of high order. It is not one of low-grade civic chores.

This program is within the long and fine tradition of American education.

This program raises questions of great challenge and great purpose.

It gives meaning to the age in which we live. But more than anything else, the concept of protective citizenship underlines the idea that a time of trouble may also be a time for greatness.

What Schools Are Doing in Atomic Energy Education

by George L. Glasheen, Chief, Educational Services Branch, U. S. Atomic Energy Commission

THIS SUMMER a group of Idaho school teachers, on scholarships arranged through the Idaho State Department of Education, participated in an intensive training course on the various aspects of atomic energy at the University of Idaho, in Moscow. This program followed two similar seminars held last year at Idaho State College, Pocatello, and at Moscow. The goal this year was the development of specific teaching material on atomic energy, prepared by the group, for inclusion in the State's study guide. These teachers heard lectures on the various peacetime applications of atomic energy. They learned of the atom's power potential and its impact upon their particular section of the country—the Northwest United States. They heard about weapons and weapons' effects, too. At the session's conclusion they were well grounded in the fundamentals of education on atomic energy.

Further west, at Oregon State College in Corvallis, a group of approximately two dozen secondary school teachers attended a week's workshop on atomic energy. They heard specialists on the subject from their own college and from the Atomic Energy Commission's installation at Richland, Washington, as well as from the University of Washington, Seattle. They spent much time in round-table discussion. They will bring back to their classrooms in the fall new knowledge on this important subject.

Elsewhere, too, teachers this summer were engaged in the study of the atom. At Ohio State University, the School of Education had planned a concentrated attack on the problem. At Morgan State college, in Baltimore, Md., a summer seminar on science was devoted to nuclear energy and its classroom implications. Later in the summer high school teachers of Aiken, South Carolina, and Augusta, Georgia, received information on atomic energy from scientists and experts from the nearby Savannah River project and elsewhere to help them get answers to questions from their students.

These are but scattered examples of the attention that educators are now giving to the study of atomic energy. Once considered by the majority as being too difficult to understand, or disposed of with a wave of the hand as being of no concern in the elementary and high school classroom, atomic energy is now finding its appropriate place in the various classrooms of the Nation. And this has been accomplished through no preconceived pattern prepared by an agency of the Federal Government of what schools should or should not teach. Rather it has been achieved through

What Schools Are Doing About Civil Defense

by Dana B. Roblee, School Relations Officer, Federal Civil Defense Administration

EVERY PERSON who feels a genuine interest in faithful communication of the American heritage is keenly concerned about the content of our country's educational programs. Among the questions he raises is whether schools and colleges are finding that civil defense has sound educational values. He inquires concerning the extent to which our institutions of learning are utilizing civil defense as an educational resource. The third question follows: How are they using it? This is a brief report designed to suggest some answers to these questions.

Civil defense may be defined as the power of civilians to prevent forces from destroying their property, industry, morale, lives, or freedoms. The effectiveness of that power in protecting from destruction, in insuring opportunity for safe, peaceful, and productive living is being determined by education—childhood education, youth education, and adult education.

Research has not yet given American educators objective material by which to analyze the values in a broad program of education in civil defense. The international tensions and the domestic stress to get something done immediately upon enactment of Public Law 920—the Civil Defense Act—led to concentration on physical skills needed in protection from destruction by atomic bombing. However, time has crystallized American fortitude; hysterical fear of calamitous atomic bombing of great masses of civilians has been superseded by more studied and courageous consideration of disaster potentials. Educational statesmen now are making a more sophisticated appraisal of the social scene and are getting deeper insights into the significance of points that merit educational emphasis.

Functional civil defense—in educational terms, protective citizenship—calls for emphasis on four facets of education. The points which it emphasizes are: an intensified sense of social interdependence and group solidarity; broadened understandings of interpersonal responsibilities; improved knowledge of today's world—the political currents, cross currents, and problems as well as understandings of modern social and scientific power; and widespread mastery of the skills which enable mankind to meet adequately the dangers and tensions of emergency situations.

Informal reports, analyses of plans, and statements in educational guides and directives clearly indicate that school systems and colleges are now perceiving that within civil defense lie resources for making protective citizenship—interpersonal, intergroup, and international—a dynamic force in American education. Programs, both of theory and of practice, are emerging with focus on increasing sensitivity to social interrelationships,

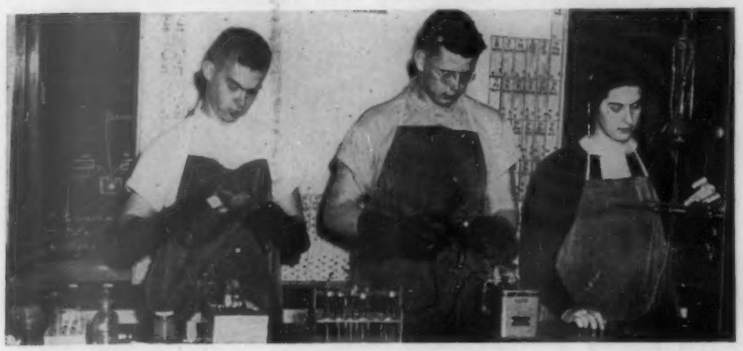
the individual initiative of many teachers working independently of each other, studying and adapting, in their own way, curriculum material on atomic energy—in the same manner as education has traditionally flowered and grown in America. In a survey conducted among selected colleges nearly 5 years ago by the United States Office of Education, one college official reported, "We have no course in atomic energy in our institution, but I doubt that there is any course that hasn't been affected in one way or another by the advent of this new force." This is probably even more true today—particularly of the secondary schools. There may be few courses devoted solely to atomic energy, but there are probably few schools anywhere in our country that have not dealt with the subject either in the science or the social studies classroom, in their extracurricular schedules or in their community participation programs. Interest in atomic energy activities runs the gamut from the elementary school through high school. There is the little girl in the second grade in Providence, R. I., for instance, who wrote on the subject of:

Good Atoms.—Everything is made of atoms. When we learn more about how valuable these atoms are, people will be very happy. We will know more about mecticine (sic) to keep people well. The farmer will know how to have better crops. The business man will have machines and better things to sell. Everybody will be happier. Mary H. 2–C.

And there are countless high school students who are engaged in the construction of complicated atomic instruments and models, such as Geiger counters, scintillation counters, Van de Graaff generators, and even working models of cyclotrons. There are those others, too, who are preparing reports and themes for their English and social studies classes and editorials for their school papers on the various social, political, and economic implications of atomic energy—projects which indicate that boys and girls of all ages and all grade levels are concerning themselves with the problems of atomic energy.

The United States Atomic Energy Commission, believing that its role should be essentially advisory, has assisted, when requested, in the development and operation of dozens of workshops, seminars, and teacher institutes on atomic energy education in nearly every section of the country since 1948. These programs have been conducted, in some cases, under the auspices of schools of education, as has been the case at Harvard, the Uni-

Students at Lincoln High School, Seattle, Wash., performing laboratory experiments with radioisotopes. *Photo courtesy Lincoln High School.*



Training in fire fighting by Washington-Lee (Va.) High School students, under supervision of fire department. *Washington Star photo.*

knowledge of social and physical powers, and understandings of world problems. These are not restricted to any one pupil-maturity level nor to any one type of institution; they are to be found in programs involving schools in all States and all grade levels of elementary schools and high schools. Also, many liberal arts colleges, teachers colleges and professional schools have developed programs involving protective citizenship concepts and practices. Usually those are not termed "civil defense"; indeed, it may be that some of these programs are being conducted without much consideration of their protective significance. Nevertheless, every educational program which teaches any of the four points identified for emphasis *is* teaching some aspect of protective citizenship—the core of civil defense. It teaches attitudes, understandings or skills which are essential for functional competence in civil defense.

One of the more extensive studies of civil defense education activities in schools and colleges was made by the Research and Statistical Standards Section, Office of Education, in the spring of 1952. The limitations of this survey and its purposes are stated in the following excerpts from the report:

The study was restricted to a sampling of elementary and secondary schools in our larger cities and to the teachers colleges and schools of education across the Nation. It was undertaken in an effort to discover whether schools had developed civil defense education programs to any large extent and to provide the Federal Civil Defense Administration with the kind of "grass-roots" information which would assist that agency in further developing the kind of program which would better meet the needs of the schools.

* * * * *

The study was actually divided into three phases—one involving a sample of elementary schools, the second, a sample of secondary schools, and the third, all teachers colleges and schools of education in universities.

* * * * *

The problem of civil defense education activities in the teachers colleges and schools of education was approached in a somewhat different manner than in the case of the schools of less than college grade.

* * * * *

With the higher institutions * * * the survey was more concerned with detecting the areas of interest of college officials in various phases of civil defense education.

The study of civil defense in elementary schools showed that:

On the basis of the data contained in the reports submitted by 437 elementary school principals, more than 95 percent of the schools have some form of civil defense education program.

Atomic Energy Education

versity of Illinois, New York University, Stanford, and the University of Maryland.

Teachers colleges were the sponsors at such locations as Danbury, Conn., Geneseo, N. Y., Providence, R. I., Keene, N. H., Greeley, Colo., and in the following Pennsylvania locations: Millersville, East Stroudsburg, Edinboro, Slippery Rock, and Indiana.

Such local public school systems as those of Minneapolis, New York City, Baltimore, Chicago, and Reno have been responsible for outstanding programs on atomic energy for their teachers. The State Department of Public Instruction at Lincoln, Nebr., has published a unit, "Facing the Facts of Atomic Energy," to guide its teachers. Oregon also has issued its atomic energy curriculum aid entitled "Learning About Atomic Energy." An important contribution to the literature on atomic energy education was made by the State Department of Public Instruction at Des Moines, Iowa, which has developed a most comprehensive set of teaching guides designed for use at the elementary, secondary, college and even adult level. A valuable guide for teachers, entitled "Atomic Energy Here to Stay," was prepared as a supplement to the March 1949 issue of SCHOOL LIFE. Even though published over 4 years ago, it is still timely, in demand, and available through the Government Printing Office. And "Atomic Energy, Double-Edged Sword of Science," a teaching unit developed under the auspices of the Committee on Experimental Units of the North Central Association of Colleges and Secondary Schools (published by Charles E. Merrill Co., Inc., Columbus, Ohio), should prove a fruitful source for many a classroom exercise on atomic energy.

One atomic energy educational project of particular significance stems from the efforts of the science teachers of the schools of the City of New York. It has already been duplicated in several other localities. Feeling that the time was right for experimentation with radioisotopes in the high school classrooms, representatives of the science faculty of the New York City schools approached the Atomic Energy Commission for advice and assistance. The result was a 13-week, 2-hour-a-week course in 1951–52 for 300 selected biology, chemistry, and physics teachers in the handling and use of radioisotopes, that most important of all research tools of the atomic age. Since then, radioactive iodine and phosphorus in small microcurie amounts have been used by selected groups of students and teachers, and a manual, entitled "Laboratory Experiments with Radioisotopes for High School Science Demonstrations," has been developed. It is available through the Superintendent of Documents, Government Printing Office. Others have followed the pioneering effort of New York City in this specialized field of atomic education. Loyola College in Baltimore, Md., the Springfield, Mass., Public Schools, and the State Department of Education in the State of Washington, as well as the Board of Education of Glen Ridge, N. J., have conducted similar courses. As a result, in the State of Washington, 27 schools are now using radioisotopes in their high school classrooms. Others in other States are following.

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Civil Defense

Principals of 773 secondary schools responded to the questionnaire used in the survey. Their responses showed:

The overwhelming majority of secondary schools replying to the inquiry have some form of civil defense education program. Naturally, there is some variation in these programs depending upon (1) the intensity of public interest in the problem, and (2) the stage of development of local civil defense organizations; the latter, of course, being largely a reflection of the former. . . .

The survey showed that civil defense activities were in operation in many of the 258 higher education institutions that responded in the study. These include faculty committees for civil defense (45 percent), and teaching of courses, including safety education, first aid, health and hygiene, fire fighting training, police training, community organization techniques, and other courses (63 percent).

Guides have been prepared in most States for schools' use in planning programs to build the attitudes, understandings, and skills of effective civil defense. The plans include suggested procedures for systems and individual institutions, if exposed to a natural disaster or to a bombing attack, to: (1) protect lives; (2) protect property; (3) protect educational services; and (4) protect, in cooperation with other agencies, community morale and industry.

Significant points in the State guides are illustrated in the following examples:

The foreword of "Civil Defense Manual for Georgia Schools" emphasizes organization of citizenship in the statement:

The slogan self-help, neighbor-help is the very essence of Civil Defense but in the complexity of our present-day society it becomes increasingly important that we organize ourselves in order to be able to survive any kind of disaster.

In a chapter titled, "Fundamental Principles in School Civil Defense," the Virginia State Department of Education publication, "A Guide to Organizing the School for Civil Defense," states:

It is imperative that each school continually explore the meaning of the principle: "We must love democracy enough to practice it and practice it enough to love it." Only as this principle becomes more meaningful in every classroom will boys and girls come to grips with issues in such a way that they do not become frustrated or develop the feeling of "What's the use? Who cares?"

In Wyoming, "Civil Defense Program for Wyoming Schools," expresses that State's concept of the program with the statement:

Civil Defense is protection against disaster for each person, his community, and his nation. But it is more than that. It is a new concept of citizenship. It means self-discipline in the interest of the common welfare.

The State of Connecticut outlines its State plan in "A Guide to Teaching Civil Defense in Our Schools." Guiding concepts are expressed in the following:

Our way of life, including democracy, a good standard of living, and important cherished human values can be preserved. Education can and must be geared to perform its inherent role in winning the battle for democratic ideologies as well as world understanding and international cooperation. This may be a long battle and we must be prepared for any emergency including the possibility of another world war.

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The School and Community Face the Atomic Age

by Mattie A. Pinette, Assistant Chief, Educational Services Branch, U. S. Atomic Energy Commission

ATOMIC ENERGY EDUCATIONAL PROJECTS are by no means confined to the classrooms of the elementary or secondary schools of our country. Adult education programs sponsored by various segments of the community in cooperation with schools, colleges and universities have been mushrooming during the past few years. In the vanguard of these activities has been the National University Extension Association.

The NUEA, comprising as it does the extension divisions of some 70 colleges and universities, early saw the importance of an enlightened public opinion with regard to atomic energy and decided to do something about it. Under the aegis of its Committee on the Implications of Atomic Energy for Adult Education, it has sponsored a traveling exhibit provided by the American Museum of Atomic Energy at Oak Ridge, Tenn. This exhibit, emphasizing the peacetime role of the atom in the fields of industry, agriculture and medicine, has concluded 2 years of travel. It has been shown in 56 communities in Alabama, Arizona, California, Colorado, Georgia, Idaho, Illinois, Louisiana, Maine, Michigan, Minnesota, New Hampshire, New York, Nebraska, North Dakota, Oregon, Pennsylvania, Texas, Utah, and Wisconsin, and has been viewed by over 600,000 people. In each city or town it was shown under the auspices of the local extension division, and in several states financial support was forthcoming from such prominent dailies as the *Philadelphia Inquirer*, the *Minneapolis Star-Tribune*, the *Detroit News*, and the *Houston Post*. In all instances local support was sought and obtained in the furnishing of facilities and manpower necessary for the showing of the exhibit. Thus was atomic energy brought to many urban and rural sections of America, through an effective working relationship between the educational institution and the community.

The NUEA has been active in other ways. It has continued an activity started by the Special Committee on Atomic Energy Information of the American Society of Newspaper Editors in developing and promoting seminars, designed to orient members of the press and radio on atomic energy matters. Working in cooperation with the United States Atomic Energy Commission, and with the press associations of several States, effective 1- and 2-day seminars were held in a number of places. At Huntsville, Ala., under the sponsorship of the Extension Division of the University of Alabama, the representatives of the press of seven Southeastern States participated. The Extension Divisions of the Universities of Wisconsin, New Hampshire, Nebraska, and Oklahoma, the Case Institute of Technology, Penn State College, and the University of Utah College of Medicine also sponsored similar seminars.

An early community project on atomic energy, to gain deserved recognition, was the effective so-called Marengo Experiment. Conducted in Marengo, Iowa, by faculty members of nearby Iowa State University, 434 people of this small town of 2,260 population participated in an adult education program. So successful was the Marengo effort that it was duplicated elsewhere in the State, adapted to radio and TV presentations, and made the basis of a guide published by the Iowa State Department of Public Instruction on adult education and atomic energy.[1]

Cooperating with the schools and colleges of the New York City area, the Religious and Welfare Committee of the New York Committee on Atomic Energy, has explored systematically and studied critically the various social, economic, moral, and political implications of atomic energy, and has contributed greatly, through its publications, to the comprehension of the subject by lay groups. What the Committee has done is a fine example of the leadership that such lay groups can exercise in the field of education on atomic energy.

The Enoch Pratt Public Library of Baltimore, Md., has conducted several outstanding programs on atomic energy, calling upon nearby universities as well as the United States Atomic Energy Commission for assistance in securing speakers and furnishing films. Their sessions have covered all aspects of atomic energy, with particular emphasis on peacetime use and the problems of international control. Other programs by other educational institutions in Baltimore were subsequently conducted as a result of the interest stimulated.

Many, also, have been the colleges and universities which have conducted lecture series on atomic energy, or one or two day institutes and seminars. Drake University, Des Moines, Iowa, held a most successful series of monthly lectures on all phases of atomic energy for the townspeople of Des Moines, as well as for its faculty and student body. An effective 2-day conference was also sponsored by the School of Engineering, Michigan State College, East Lansing, Mich., to which were invited executives and representatives of industry, engineers, public health and civil defense officials, the general public and teachers of engineering and science. They were typical of similar programs undertaken by the University of Southern California, the Bridgeport Engineering Institute of Bridgeport, Conn., Roosevelt College, Chicago, Ill., St. John's College, Brooklyn, N. Y., and the University of Cincinnati, Cincinnati, Ohio, to mention but a few. Many high schools have received the enthusiastic support of their communities in organizing Atomic Energy Weeks, featuring exhibits in the school auditorium, downtown store-window displays, perhaps a speaker or two followed by a discussion forum, the showing of films, etc.

Today countless citizens and future citizens of America together are learning to understand the atom through cooperative school-community programs. A subject which was once considered the special domain of the academician is being debated in the public square. The hard fact is that we in America have become aware that atomic energy is a controlling factor in the survival of our democratic way of life and that if the freedoms we cherish are to be preserved this new force must be understood by our people.

[1] Vol. V. The Iowa Plan for Atomic Energy Education.

The Atomic Age Moves Forward

(*Continued from page 149*)

Radioisotopes in Industry

Radioisotopes are being used ever more widely in industry. One of the most interesting applications is the use of radioactive "markers" in oil pipelines to show the boundary between the various products pumped through the line. Several oil companies use this technique. Each time a pump station changes the product in the line, a small amount of radioactive antimony is injected between the products. As the junction or interface between the two products moves along the line, the tracer flows with it. With the aid of radiation instruments operators know when one product has passed the cut-off valves and when it is time to switch the new stream of gasoline or oil to the proper tank. The radiation from the radioisotopes can also be used to start or stop the pumps automatically by remote control.

Another application of radioisotopes is in piston ring and lubrication wear studies. In measuring friction a great advantage of the radioisotope method is that it makes it possible to measure the transfer of metal in amounts as low as 1/100,000 of an ounce, sample the oil while the motor is in operation, and locate the point of wear in the motor.

Radioactive calcium has been used in studying the efficiency of detergents, and radioactive strontium in studying the movement of preservatives in telephone poles. The fact that pole replacement in the United States cost $200 million a year is an indication of the importance of this new industrial application of radioisotopes.

The Weather Bureau in California uses a gage with a radiation source to measure the water content of snowfall. Accurate measurement of the water content of the snowpack on mountain slopes is a key factor in efficient use of this stored water for industrial, agricultural and other purposes.

The United States Atomic Energy program, itself an industry of tremendous size (it is bigger in plant investment than General Motors and United States Steel combined), stimulates other industries. Take the radiation instrument industry, for instance. Prior to 1947, there was not in existence any appreciable radiation instrument industry, the Manhattan Engineering District and the Atomic Energy Commission being practically the only users. In 1948, there were 45 radiation instrument companies employing 670 people and doing an estimated volume of business amounting to $4,200,000. In 1952 there were 80 companies employing 2,410 persons in a $20,000,000 business.

The mining industry, too, has felt the impact of the atom. In 1948, when the AEC began its domestic uranium procurement program there were two plants in operation in the Colorado Plateau for the production of uranium concentrates. In 1953, there are 8 such plants operating. In 1948, AEC-sponsored drilling approximated 130,000 feet. In 1952 this figure had increased to more than 1,000,000 feet.

By no means are the benefits of atomic energy limited to medicine and industry. Atomic byproducts have contributed in large measure to agricultural research.

Radioisotopes in Agriculture

Radioisotopes have enabled scientists to trace nutrients through the soil, into roots and thence to plants, to measure the extent and speed of their movement to determine at which stage in its growing cycle the plant needs fertilizer most, to know where and how fertilizer should be placed to give the plants the maximum benefit, and to establish what kinds of fertilizers work best in the country's varied soils. American farmers spend $750 million a year for commercial fertilizer. As isotopes continue to point out ways of getting more efficient utilization of this commodity, one of the farmer's biggest operating costs will be appreciably reduced. One authority estimates that more has been learned about the use of fertilizer in the past 4 years through the use of radioisotopes than in the preceding 50 years by other means.

Fungi and insects inflict $6 billion of damage a year, and weeds are a further source of loss. Experiments are under way to control these pests, such as the parasitic leaf blight fungus of peanut plants, wild onion and Canada thistle which smother fields of soybeans, beans and oats, and quack grass which stifle flax, clover and alfalfa.

Each year California fruit growers lose a sizeable proportion of their orange, grapefruit and lemon crops to the citrus thrip, red aphids and red mites and other sucking insects. Radioisotopes are peculiarly useful in determining the efficiency of pest-killing preparations because insecticides and weed-killers are ordinarily used at such low concentration that detecting them by other means is difficult or impossible.

In the fields of biochemistry, physiology and nutrition, radioisotopes are being used as a major tool in at least 65 percent of the institutions carrying on significant research in these fields. Radioactive minerals are being used to learn how animals, especially poultry, hogs and cattle, absorb certain elements, build them into bone and muscle, utilize them in reproduction functions and put them into eggs and milk.

Improved strains of various crops have been produced from experiments in plant genetics.

An example is a mutation produced at AEC's Brookhaven laboratories. The mutant is a shorter plant with a higher proportion of grain to stalk. In these experiments the plants are exposed to radiation, and mutations, which otherwise might not appear for centuries, are forced within short periods.

And many other experiments have produced results important to the farmer, and therefore, to all of us. In a short period of years, the use of radioisotopes has progressed from an unusual laboratory technique to a method that is an integral part of many agronomic research programs. Over 30 State experiment stations, United States Department of Agriculture, various foreign countries and many private organizations are using radioisotopes in agronomic research.

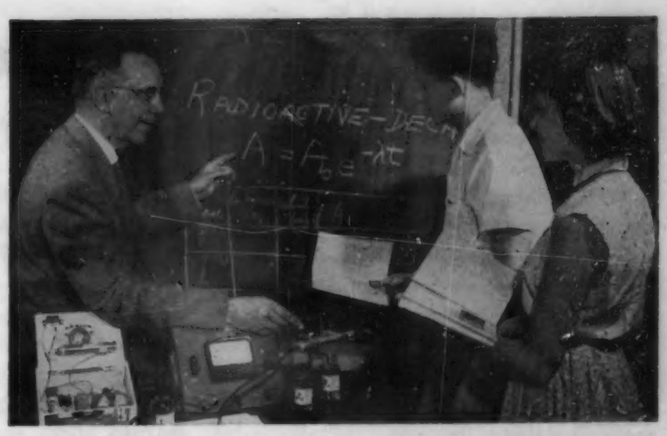
Still other current research holds out the hope that man, through atomic energy, may learn the secret of the now-mysterious process by which nature produces food and fuel from sunlight, air and water, the process of photosynthesis.

All of this is progress recorded in a little more than one decade. It is without parallel in history. It is breathtaking, and it is undeniably a part of American culture. We cannot dissociate ourselves from it simply because we dislike its frightening aspects. While we have constantly before us the perils inherent in the atomic arms race into which we have been forced, we must not

(*Continued on page 159*)

Curriculum Adaptation to Changing Needs

by Ryland W. Crary, Chief, Schools Branch,
Federal Civil Defense Administration



Science students at Erasmus Hall High School, Brooklyn, N. Y., being briefed on laboratory experiment to determine half life of radioactive materials.

RAPIDLY SHIFTING CURRENTS of political, economic, and social life present educational opportunity.

To be sure, schoolmen harassed by the insistences of dozens of curriculum pressures may think that opportunity is spelled h-e-a-d-a-c-h-e in this case.

But curriculum adaptation does not mean that the school program should be a weathervane responding to the ever-changing winds of the contemporary scene.

Continuing adaptation of the curriculum is actually the only way to insure stability of educational experience. Stability is not insured by static program. Wherever elements of a static program become nonfunctional, they produce spotty, irregular learning situations, frustrating to the learner and damaging to his security. Our objectives may be more constant, and vital, if we are continually evaluating our program in terms of its effect on the learners.

The Key Relationship

Of course, adaptation of the curriculum involves method. Let us not for a minute make an either/or choice between method and content. Generally speaking, one can assess the probabilities in favor of responsiveness of the curriculum to changing needs by a survey of methods utilized in a school to achieve program change. The presence of these operational factors in a school system makes it reasonable to predict a fair degree of program responsiveness to social needs:

(*a*) Program coordination is a recognized, well-staffed professional function.

(*b*) Faculty involvement in curriculum development is encouraged and effectively institutionalized.

(*c*) Classroom experimentation in student-teacher planning and cooperative procedures is at a healthy level.

(*d*) Faculty and staff are deeply involved in professional educational life, through organization membership; summer school, workshop and travel experience; community life; inservice training programs; and professional reading.

(*e*) School-community relations are in a state of ready two-way communication, so that community support for program change is a constant, rather than a sporadic—and unpredictable—factor.

This checklist of operational factors, however oversimplified, indicates where the realistic starting point for curriculum adaptation lies. To both administrators and citizens eager for curriculum change, it suggests that only the school professionally organized in terms of modern educational principles is likely to be adaptable to the demands of our times.

Sound methods will scarcely prove themselves in a vacuum, it may be insisted. That is just the point—or rather it is just *not* the point: the pattern of operational factors stated briefly heretofore, is not a vacuum context—it exists only because there is a rich and fertile field of experience—professional and social—in which it takes root and thrives.

Opportunity in New Problems

The term "atomic age" is shorthand for a fascinating complex of postwar developments, among them: amazing scientific and technological developments; striking changes of politics and empire; sociological shifts and economic upheavals; a struggle to establish new institutions of world order; cold war.

It is doubtful that even the most sheltered of academies, the most rigid of curriculums, have remained immune from the impact of these shattering circumstances.

It is certain that the stability of the programs of modern schools—directed in our society toward such constant educational values as developing "rich and many-sided personalities" and "making the world meaningful" and "building good citizenship"—owes much to adaptations which derive from the modern school's deep roots in its social environment.

Among the adaptations that have been developing, and are still developing, are many which affect peculiarly "Citizenship for an Atomic Age." These may be stated as "emerging understandings," or a "developing consensus" for our time of stress and crisis. As they are stated here, they are to be read, not as a bill of particulars, certainly not as a blue print—but more as a summary of experience to date. Insofar as they are a valid summary of experience they may constitute worthwhile guidelines for consideration or as working hypotheses around which to build certain educational experiences for today's youth.

These may be suggested as representative of such understandings:

(*a*) The postwar world developed as a paradox of hope and fear—of affirmation and negation. On the one hand, the achievements of the United Nations in our struggle to establish institutions of world order; on the other, the cold war and the aggressions and obstructions of the stubborn Soviet bloc.

(*Continued on page 160*)

Laboratory Practice in Protective Skills

by Ron W. Davis,* Citizenship Education Project, Teachers College, Columbia University

NOT LONG AGO, a busy civil defense officer sat talking with a student committee that had come to him to find out how high school students could contribute to the local civil defense program. What could students do? He had often thought students could help in many ways. Now they were asking him about it, and even suggesting things they could do.

The students were from a school participating in the citizenship education project (CEP). The ideas they were recommending were developed by CEP in cooperation with the Federal Civil Defense Administration and the American Red Cross, and published as part of CEP's laboratory practice materials.

In this particular community, the students, their teacher and CD officers ran through CEP's laboratory practice suggestions and used the ideas that were practical in their local situation. For example, students organized an air-ground observer team, published a local CD newsletter, and operated a civil defense information center. If the community had been in a critical target area, they might have carried out such laboratory practices as encouraging citizens to build home shelters and helping conduct field surveys and make block maps.

The CD officer, like a great many other Americans who are interested in how public schools are teaching citizenship, began by asking questions. What is a laboratory practice? How does it develop citizenship skills and attitudes? How does the CEP program contribute to citizenship in an atomic age?

A Laboratory Practice teaches students citizenship concepts and helps them develop civic skills by giving them the opportunity for real citizenship action. They collect information firsthand and do something about a problem or some particular situation in their own community. It is fairly common for students to hold a mock court trial or visit their local court to observe how the rights of citizens in a democracy are safeguarded. These can be good learning experiences, but unlike a laboratory practice they do not deal with real situations about which students take related actions. How can laboratory practices be used in studying the judicial branch of our Government? In one community students visited a local court and, after talking with municipal judges and the court clerk, they canvassed the town to encourage citizens to volunteer for jury duty. In this way they not only learned about our democratic rights, but developed citizenship skills by taking action to help protect and strengthen these rights. Learning citizenship by taking action as citizens is the prime emphasis of a laboratory practice.

Recently CEP, in cooperation with the Federal Civil Defense Administration and the American Red Cross, developed a number of laboratory practice suggestions in the areas of national emergency and disaster preparedness. Here are brief digests of three of these practices.

Making a plan for using school facilities during a local disaster.—In this practice students, cooperating with school officials and local CD officers, survey local school buildings to see how the existing school facilities could help the community deal with a disaster or major emergency, such as an atomic attack, flood, or earthquake. For example, they find to what extent these facilities can provide temporary shelter, medical aid, meals, and centers for effectively using these facilities.

Organizing an air-ground observer team.—This suggests that students can organize an air-ground observer team, study plane-spotting techniques, and serve as air-ground observers with other CD volunteers. One class might take over responsibility for manning a particular observation post during certain hours of each day. A rotating schedule would allow each class member to participate in actually manning the post.

Informing the community about the need for disaster preparedness.—An unsolved problem in many communities is how to get citizens to prepare for disasters before they strike. In this practice students work with groups which are active during local disasters. They help plan and carry out a campaign to tell the community what is needed in the way of a disaster preparedness program, and encourage local citizens to cooperate in putting such a program into action.

Other practice descriptions in these areas suggest how a teacher and his students might go about:

Organizing and conducting disaster drills in the school.

Helping take a civil defense block census.

Forming a civil defense medical aide team.

Planning an emergency child-care center.

Helping recruit and organize a disaster rescue team.

The laboratory practices outlined above are only a part of CEP's attempt to help schools do a more effective job of teaching what freedom means, and to train students in the "know-how" required to remain free. In addition to national defense, there are practice suggestions that cover many other aspects of our social, political and economic life. Many other kinds of materials, as well as the services of trained regional representatives, help administrators and teachers in all parts of the nation plan positive programs of citizenship education. CEP

*Chairman, Laboratory Practice Development.

A Challenge to American Education

WHAT the young men and women in our schools and colleges learn, how they are trained to think, what moral principles they embrace, and what attitudes guide their actions, will determine the future of this Nation and to a great extent the course of world history. They must be given every assistance within our power to prepare themselves for this challenge. The responsibility rests heavily upon those who man our educational institutions; but in the last analysis, it must be borne by all the people. On the timeliness and wisdom of the people's decisions depend the safety of America and the prospects of peace in the world.

—Education and National Security, Educational Policies Commission and The American Council on Education, 1951

aims to develop in students that deep and active interest in public affairs, both local and national, which alone can guarantee our free way of life.

The beginning of CEP goes back scarcely 3 years. When General Eisenhower became president of Columbia University, Dr. William F. Russell, president of Teachers College, discussed with him the offer of the Carnegie Corporation to support a program which would realistically tackle the problem of improving the teaching of citizenship. The result was the citizenship education project, which today is working with 527 school systems in 37 States and Hawaii, with 970 individual schools, 1,857 teachers, and approximately 55,000 boys and girls of junior and senior high-school age.

In all parts of the Nation, CEP is helping boys and girls get citizenship training by acting in real life situations. Citizenship in an atomic age calls for well educated, clear thinking citizens. Even more, it calls for citizens who know and cherish their rights, who cheerfully discharge their citizenship responsibilities, and who know how to act in a citizenship capacity when action is called for.

Atomic Energy Education

(*Continued from page 154*)

These are but a few examples of what the schools are doing and they tell only a partial story of what is going on in this new and broad field of education in atomic energy. Space does not permit the telling of the story that is contained in the thousands of letters received each year by the Educational Services Branch of the United States Atomic Energy Commission. These letters come from every State and from young people of all ages and grades. They ask for advice, assistance and information on various phases of atomic energy—its medical implications, such as what progress is being made in cancer research, what is going on in the field of agricultural research, what about power development, and the design and development of nuclear reactors for submarine and surface vessels, what of the possibilities for international control of atomic energy, or requests for information on the latest tests in Nevada or in Eniwetok. They are letters which show a general understanding of the facts and problems of atomic energy and they show a desire on the part of school children, educators and adults to try to learn more in order to adjust to this

Democracy's way of life is on trial in our homes, in our schools, in our communities, in all free nations. Democracy is on trial today in the near and the far places of earth.

We have for use in these days of trial all the strength and the promise that democracy has given us from earlier days. We know how to help the individual to help himself; to work with others in identifying common needs and in finding ways of meeting these needs; to share in the making of decisions by which he will be affected.

Growing Up in an Anxious Age, Association for Supervision and Curriculum Development, National Education Association, 1952 Yearbook.

atomic age. Perhaps the letter from an eighth grade student in California might be considered typical of the interest and concern exhibited by the young people of this generation. He writes in answer to receipt of material requested by him:

> Before I received your publications I never thought that the field of atomic energy was so vast. But now I see there is a never ending possibility of putting atomic energy to work for us.

As has been emphasized, the United States Atomic Energy Commission feels that education on atomic energy is the business of educators and that it is not the job of the Commission to develop course outlines or other curriculum materials. It does feel that it should offer advice and assistance on atomic energy subjects, when so requested, and this it has done over the past few years, and will continue to do. It has cooperated in the development of school and teacher programs on atomic energy. It has helped in the securing of speakers for atomic energy meetings. It has loaned films. It has also made available literature on nearly every phase of atomic energy progress and development. It is the job of the schools to mold these source materials into teaching materials. This the schools are doing, with satisfying and encouraging results.

Civil Defense

(*Continued from page 154*)

In New Mexico, the "Manual for Civilian Defense in the Schools" quotes from the edited consolidation of reports prepared by a committee of the National Association of Secondary School Principals and a committee of the Department of Elementary School Principals and states that:

> Whatever is done in curriculum modification should be developed by local school personnel in harmony with the imperative needs of youth.

The State Department of Public Instruction, Iowa, has developed a program involving all grade levels and providing flexibility to meet varying needs of different communities and of changing circumstances. The bulletin, "A Program for Civil Defense in the Schools of Iowa," was prepared by a production committee in accordance with recommendations of a Central Planning Committee of Iowa educators. The following excerpt from the foreword suggests the comprehensive pattern of civil defense in the Iowa school planning:

> In this pamphlet the term *civil defense* is given broad interpretation. It will include defense against fire, flood, tornadoes, and epidemics, defense against internal subversive groups, as well as defense against enemy warfare. . . .
>
> First and foremost is the prevention of fear in the minds of children by teaching them the best things to do in any and all emergencies. . . .

Chapter One of "Design for Defense—The Role of Utah's Schools," gives some insights into the relationship of civil defense to the school curriculum in that State. It states, in part:

> Civil defense concepts will and should have some impact on school curriculum. If the schools are providing the kinds of opportunities and experiences which will help children and youth to grow up and to accept and take part in the democratic way of life, then civil defense must be a part of that training.

Thus, schools and colleges recognize that Civil Defense is an educational resource and many already have modified their programs through supplementary and integrational offerings so as to draw out the social values of this newly identified dimension of American life-protective citizenship.

The Atomic Age Moves Forward

(*Continued from page 156*)

become so preoccupied with the destructiveness of atomic energy that we overlook its wondrous benefits. To a large degree the educators of this country are the ones who can see to it that a healthy outlook upon the developing atomic age is developed among the youth of America. Along with those who govern us we must never cease to work for peace and understanding among peoples so that the concern with national self-preservation can some day give way to a desire for universal well-being as the motive force of atomic progress.

Small High Schools

(*Continued from page 147*)

visitors were led to another location where three of our girls explained the use of isotopes in medicine, agriculture and industry. Here "hot atoms" were pictured by colorful charts. The next station displayed the working tools of the atomic scientist including several electroscopes, a spinthariscope, Geiger counter, supersniffer, dosimeter and model cloud chamber. The last "punch line" of the show was our new 200,000 volt Van de Graaff electrostatic generator. This splendid piece of equipment shot a crackling 5-inch spark, and while it made the youngsters who got too close do a new style of oriental dance, it was nevertheless quite harmless.

Except for two purchased pieces, our entire display has cost us very little. The help of our art and shop teachers combined with kid imagination and enthusiasm, made up for the lack of funds.

In 1949, our boys with the help of the sheet metal shop in town, built a 6-foot working model of the Van de Graaff atom smasher after the specifications of Professor Regalbuto of Columbia University. We still get requests from clubs all over America for the details of construction.

Perhaps the high point in this year's activities was the trip to the National Atomic Energy Laboratory at Brookhaven, Long Island. As guests of the AEC for the day, our 36 wide-eyed junior scientists saw the Cosmotron (the newest and largest atomic accelerator in the world), the 60-inch cyclotron, the "hot laboratory" where highly radioactive materials are chemically processed, the meteorology installation, and a scale model of the huge atomic reactor. This field trip served well as a grand windup of our year's work.

It is customary at the last meeting of the year for each member to write a short paper on how he thinks we can improve our program for the following year. Many cross currents of opinion come out of these reports, but it seems to me worthy of note that quite a few of the seniors felt that the "conducted tour" type of show was so successful that it should be taken right into other schools in our town. In their opinion, no fortune teller has a crystal ball big enough to list all of the blessings to which man will fall heir, and with just a little encouragement from us they know they can harness this smallest thing in the universe, which has suddenly become the largest thing, to the greater good of mankind.

HERE then is a call to action for educational statesmanship in this perilous period of our history. How well we meet this challenge will determine whether we shall keep and expand our freedoms in peace and prosperity or whether we shall be compelled to yield to enemies both within and without. In the struggle the youth of America constitute our best resource and our greatest hope. The responsibilty is overwhelming to nurture them in body, mind, and spirit, and to give them faith.

This age brings democracy great opportunities as well as dangers. The same lines of attack will promote the one and curtail the other, provided educational leadership will keep open the channels of learning and enlightenment for American youth. . . .

—American School Curriculum, Thirty-first Yearbook of the American Association of School Administrators

Curriculum Adaptation to Changing Needs

(*Continued from page 157*)

(*b*) The problem posed by the dilemma of conflict between science and morality continues. Scientific advancement—atomic research, jet propulsion, electronics—remains neutral as to its ultimate effect on humanity. It remains a matter of choice—moral choice—whether man is to elect to emancipate or exterminate himself through his sciences.

(*c*) The problems of the postwar world have placed new obligations on citizenship. With democracy on trial, and in severest issue with mortal enemy, the citizen's obligation to know, value, and protect his way of life is extended. Civic responsibility assumes new dimensions from the immediate problems of the neighborhood to the arena of responsible judgments on world affairs.

(*d*) The hazards of the changed world have become known to America. These hazards are simply the conditions of life in the twentieth century. They will be adequately met through education neither by hysteria nor by avoidance. But they are an educational responsibility: to counteract fear, emotional security must be developed; to build civic responsibility, deep-rooted "whys and wherefores" must be established; to lend ability to cope with emergency in any form, skills must be developed; to create enduring morale, education must pursue its great constants, its quest for the meaning of truth and beauty and the good life.

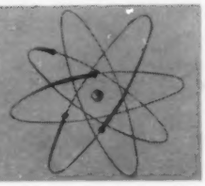
To live in this kind of world—and this is the only kind of world in which today's children have the option of living—to live in this kind of world calls for knowing a great many things which yesterday's children did not know, could not know, had no need to know. These, too, must now be learned. And where are they to be learned if not in the schools?

Life Adjustment Education in the American Culture. Circular No. 335, United States Office of Education, 1951.

To order additional copies of this special issue of SCHOOL LIFE, or the 1949 supplement "Atomic Energy Here to Stay", send your request to the Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C. (25 percent discount on 100 copies or more sent to one address.) Single copy price of 1949 supplement, 10 cents. Price of this supplement, "Citizenship for the Atomic Age," is 15 cents. Send your order in early to insure getting your additional copies. Enclose check or money order with your request.

U. S. GOVERNMENT PRINTING OFFICE: 1953

Atomic Energy and Civil Defense TEACHING AIDS



Atomic Energy

The Atom at Work. By Jacob Sacks. New York, Ronald Press, 1951. 327 p. $4.

The Effects of Atomic Weapons. Prepared under the direction of the Los Alamos Scientific Laboratory for and in cooperation with the United States Department of Defense and the United States Atomic Energy Commission. Washington, D. C. 456 p. $1.25.

Explaining the Atom. By Selig Hecht, New York, Viking, 1947. 205 p. $3.

A General Account of the Development of Methods of Using Atomic Energy for Military Purposes Under the Auspices of the U. S. Government 1940–45. By H. D. Smyth, Washington, D. C., 1945. 182 p. 40 cents.

Laboratory Experiments With Radioisotopes for High School Science Demonstrations. Washington, D. C., 1953. Edited by Supervisor of Science, High School Division, Board of Education of New York City and the Atomic Energy Commission. 53 p. 25 cents.

A series of 20 simple experiments developed by six New York City high school science teachers.

Nucleonics—What Everybody Should Know About Atomic Physics. Based on official material prepared under auspices of U. S. Navy Department. Published in cooperation with Public Affairs Press. 1946. 38 p. $1.

The Seventh (Atomic Energy and the Physical Sciences) and Eleventh (Some Applications of Atomic Energy in Plant Science) Semiannual Reports of the Atomic Energy Commission to the Congress. Washington, D. C. 7th Report, 228 p. 50 cents. †11th Report, 211 p. 50 cents.

Civil Defense

Civil Defense in Schools. Federal Civil Defense Administration, Washington, D. C. 1952. 32 p. 15 cents.

Emergency Action to Save Lives. Federal Civil Defense Administration, Washington, D. C. 1951. 32 p. 5 cents.

Fire Fighting for Householders. Federal Civil Defense Administration, Washington, D. C. 1951. 31 p. 5 cents.

Survival Under Atomic Attack. Federal Civil Defense Administration, Washington, D. C. 1950. 31 p. 10 cents.

†Other semiannual reports of the Commission useful for those who wish to follow progress of atomic energy developments.

Civil Defense Supplement to the American Red Cross First Aid Textbook. American National Red Cross. Philadelphia. The Blakiston Company, 1951. 47 p. 10 cents.

For INSTRUCTIONAL AND RESOURCE UNITS see listings in Bibliographies.

Bibliographies

Annotated Civil Defense Bibliography for Teachers. Federal Civil Defense Administration. Washington, D. C. 1951. 28 p. 20 cents.

Selected Readings on Atomic Energy. Atomic Energy Commission, Washington, D. C. 1951. 23 p. 15 cents.

Films

***A Is for Atom—1953.** Produced by General Electric Co. 15 minutes, 16 mm. sound; in color. Available on loan from the General Electric Company, Schenectady, N. Y.

An animated cartoon film explaining atomic structure and nuclear fission.

***The Atom and Agriculture—1953.** Produced by Encyclopaedia Britannica, Films, Inc., Wilmette, Ill. 10 min, 16 mm. sound. $50.

Explains areas in which radioactivity (including radioisotopes) can be used in agriculture.

***The Atom and Industry—1953.** 10 minutes, 16 mm. sound. $50. Produced by Encyclopaedia Britannica Films, Inc., Wilmette, Ill.

Uses of radioisotope in industrial processes.

***The Atom and You**—16 minutes, 16 mm. sound. Produced by Paramount News, Inc., 44 West 43d Street, New York, N. Y. Price $50.

A series of 3 news reels, (consolidated into 1) covering the use of radioisotopes in biology and medicine, agriculture and industry.

***Atomic Energy Can Be a Blessing—1953.** Produced by Jack Denove Productions, Hollywood, Calif., for The Christophers. 25 minutes, 16 mm. sound. Cost $30. Source: The Christophers, 18 East 48th Street, New York 17, N. Y.

Emphasizes peaceful atom and career opportunities.

***Atomic Physics.** Produced by the J. Arthur Rank Organization, Ltd., and released in the United States by the United World Films, Inc.—90 minutes, 16 mm. sound; cost, unknown; source: United World Films, Inc., 445 Park Avenue, New York 22, N. Y.

An authoritative film on the history and development of atomic energy. The film is in five parts.

Fire Fighting for Householders—1951. 11 minutes, black and white, sound. $17.50 (Purchase) United World Films, 1445 Park Avenue, New York 29, N. Y.

Operation Doorstep—1953. Produced and owned by Byron, Inc., 1226 Wisconsin Avenue NW., Washington, D. C., with the cooperation of Federal Civil Defense Administration; 16 mm. sound. $27. 10 minutes. On loan from any Federal Civil Defense Administration Regional Office.

Based on the civil defense atomic test conducted at the AEC Nevada Proving Grounds on March 17, 1953.

Survival Under Atomic Attack—1951. 9 minutes, black and white, sound. $17.50 (Purchase) United World Films, Inc., 1445 Park Avenue, New York 29, N. Y.

Scenes of devastated Hiroshima illustrate blast, heat, and radiation effects of atomic bombing. Six basic rules of survival are discussed.

What You Should Know About Biological Warfare—1951. 10 minutes, black and white; sound. $17.50 (Purchase) United World Films, Inc., 1445 Park Avenue, New York 29, N. Y.

Filmstrips

The Atom—Life filmstrip in color. 55 frames with reprint of Life's article in the May 16, 1949, issue, included as lecture notes. $4.50. Address: Life Filmstrips, Time and Life Building, 9 Rockefeller Plaza, New York, N. Y.

Atomic Physics—Based on the J. Arthur Rank film of the same name. There are 5 filmstrips in the series, costing $3.00 a filmstrip; or $12.50 if all 5 filmstrips are purchased. Available from United World Films, Inc., 1445 Park Avenue, New York 29, N. Y.

Making Atomic Energy Help Mankind—Produced by Popular Science Publishing Co., Audio Visual Division, 353 4th Avenue, New York 10, N. Y. 39 frames, depicting use of radioisotopes in biology and medicine.

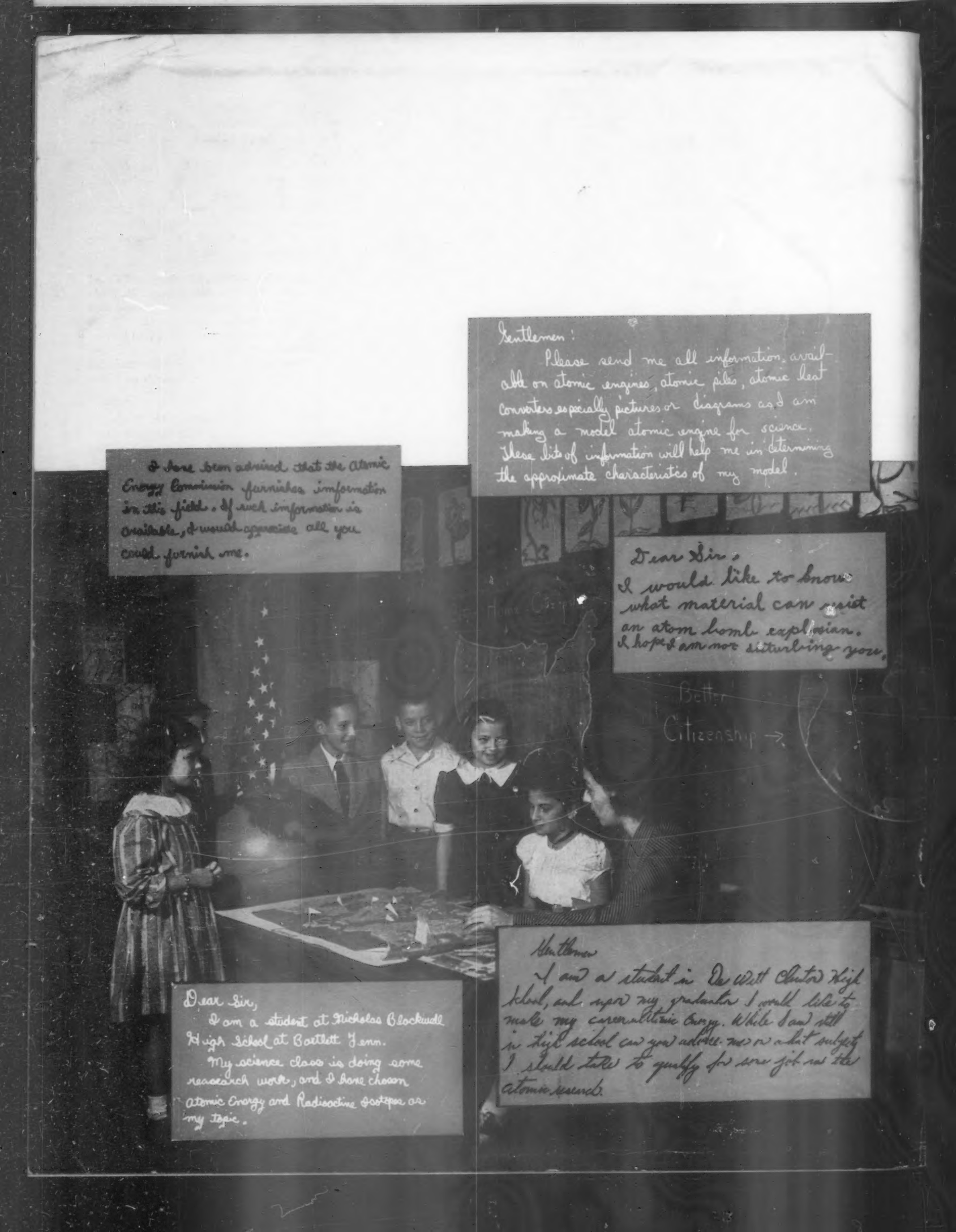
Your Atomic World—Produced by The Council on Atomic Implications, Inc. Distributed by Society for Visual Education, Inc., 1345 West Diversey Ave., Chicago 14, Ill. $12 for set of 2.

Part I—Let's Look at the Atom—53 frames in full color. Emphasis on scientific principles of atomic structure and nuclear fission.

Part II—The Atom at Work—52 frames, full color. Emphasis on uses of atomic energy.

*Available on loan from AEC.

(Publications are for sale by the Superintendent of Documents, Government Printing Office, Washington 25, D. C., unless otherwise indicated)


Gentlemen:
Please send me all information available on atomic engines, atomic piles, atomic heat converters especially pictures or diagrams as I am making a model atomic engine for science. These bits of information will help me in determining the approximate characteristics of my model.
I have been advised that the Atomic Energy Commission furnishes information in this field. If such information is available, I would appreciate all you could furnish me.
Dear Sir:
I would like to know what material can resist an atom bomb explosion. I hope I am not disturbing you.
Better
Citizenship →
Dear Sir,
I am a student at Nicholas Blackwell High School at Bartlett Tenn.
My science class is doing some research work, and I have chosen Atomic Energy and Radioactive Isotopes as my topic.
Gentlemen
I am a student in De Witt Clinton High School, and upon my graduation I would like to make my career in Atomic Energy. While I am still in high school can you advise me as to what subject I should take to qualify for some job in the Atomic research.